ANALYTE DETECTION IN LIQUIDS WITH CARBON NANOTUBE FIELD EFFECT TRANSMISSION DEVICES

ABSTRACT OF THE DISCLOSURE

Field-effect transistor (FET) devices with carbon nanotubes as the conducting channel detect chemicals in liquids are described. Chemical detection occurs primarily through analysis of conduction (I) as a function of the applied gate voltage (Vg). The conductivity of liquids is an important variable in the analysis of measurements of the device performance. In high-conducting liquids, screening and liquid conductance dominate in the device measurements; in low-conductive liquids (*e.g.*, cyclohexane), the changes in the NTFET device performance upon exposure to different chemicals are similar to those found for the performance of the device in a gaseous environment. The influence of aromatic compounds on the device electronics can be correlated with their relative ability to donate or withdraw electrons from the carbon nanotube. A shift in the threshold of I-Vg was found to be linear with Hammett sigma values (σ_p) for mono-substituted benzene compounds.